

CLAIMS

What is claimed is:

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1. A method for managing a mutex in a data processing system, the method comprising:

maintaining an average acquisition cost value for a mutex;

10 attempting to acquire the mutex by a first thread; and

in response to a determination that the mutex has already been acquired by a second thread, determining to enter a spin state or a sleep state on the first thread based on the average acquisition cost value for the
15 mutex.

2. The method of claim 1 wherein the average acquisition cost value indicates an average consumption of computational resources by threads in acquiring the
20 mutex.

3. The method of claim 1 further comprising:
maintaining a thread-specific current acquisition
25 cost value that represents a consumption of computational resources by the first thread after an initial attempt to acquire the mutex and prior to acquiring the mutex; and
in response to the first thread acquiring the mutex, recomputing the average acquisition cost value for the
30 mutex to include the thread-specific current acquisition cost value.

4. The method of claim 1 further comprising:
entering a spin state if the average acquisition
cost value satisfies a first condition; and
5 entering a sleep state if the average acquisition
cost value satisfies a second condition.

5. The method of claim 4 wherein the first condition is
that the average acquisition cost value is less than a
10 threshold value, and wherein the second condition is that
the average acquisition cost value is greater than or
equal to a threshold value.

6. The method of claim 5 wherein the threshold value is
15 related to an amount of time that is required by a thread
to enter and then exit a sleep state.

7. The method of claim 1 further comprising:
entering a spin state or a sleep state on the first
20 thread; and
after exiting the spin state or the sleep state on
the first thread, computing or retrieving a cost value
that indicates a consumption of computational resources
by the first thread during the spin state or the sleep
25 state.

8. The method of claim 7 further comprising:

entering a spin state on the first thread by
executing a busy-wait loop; and

5 computing the cost value that indicates a
consumption of computational resources by the first
thread during the spin state based on a number of
iterations that are executed within the busy-wait loop.

9. The method of claim 7 further comprising:

10 entering a sleep state on the first thread by
executing a system call to suspend execution of the first
thread; and

computing the cost value that indicates a
consumption of computational resources by the first
15 thread during the sleep state based on an amount of time
that the first thread is in the sleep state.

10. The method of claim 7 further comprising:

adding the cost value that indicates a consumption
20 of computational resources by the first thread during the
spin state or the sleep state to a current acquisition
cost value that represents a consumption of computational
resources by the first thread after an initial attempt to
acquire the mutex and prior to acquiring the mutex.

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11. The method of claim 7 further comprising:

normalizing the cost value that indicates a
consumption of computational resources by the first
thread during the spin state or the sleep state prior to
30 adding it to the current acquisition cost value.

12. An apparatus for managing a mutex in a data processing system, the apparatus comprising:

means for maintaining an average acquisition cost value for a mutex;

5 means for attempting to acquire the mutex by a first thread; and

means for determining to enter a spin state or a sleep state on the first thread based on the average acquisition cost value for the mutex in response to a determination that the mutex has already been acquired by
10 a second thread.

13. The apparatus of claim 12 wherein the average acquisition cost value indicates an average consumption
15 of computational resources by threads in acquiring the mutex.

14. The apparatus of claim 12 further comprising:

means for maintaining a thread-specific current
20 acquisition cost value that represents a consumption of computational resources by the first thread after an initial attempt to acquire the mutex and prior to acquiring the mutex; and

means for recomputing the average acquisition cost
25 value for the mutex to include the thread-specific current acquisition cost value in response to the first thread acquiring the mutex.

15. The apparatus of claim 12 further comprising:
means for entering a spin state if the average
acquisition cost value satisfies a first condition; and
means for entering a sleep state if the average
5 acquisition cost value satisfies a second condition.

16. The apparatus of claim 15 wherein the first
condition is that the average acquisition cost value is
less than a threshold value, and wherein the second
10 condition is that the average acquisition cost value is
greater than or equal to a threshold value.

17. The apparatus of claim 16 wherein the threshold
value is related to an amount of time that is required by
15 a thread to enter and then exit a sleep state.

18. The apparatus of claim 12 further comprising:
means for entering a spin state or a sleep state on
the first thread; and
20 means for computing or retrieving a cost value that
indicates a consumption of computational resources by the
first thread during the spin state or the sleep state
after exiting the spin state or the sleep state on the
first thread.

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19. The apparatus of claim 18 further comprising:

means for entering a spin state on the first thread by executing a busy-wait loop; and

5 means for computing the cost value that indicates a consumption of computational resources by the first thread during the spin state based on a number of iterations that are executed within the busy-wait loop.

20. The apparatus of claim 18 further comprising:

10 means for entering a sleep state on the first thread by executing a system call to suspend execution of the first thread; and

means for computing the cost value that indicates a consumption of computational resources by the first
15 thread during the sleep state based on an amount of time that the first thread is in the sleep state.

21. The apparatus of claim 18 further comprising:

means for adding the cost value that indicates a
20 consumption of computational resources by the first thread during the spin state or the sleep state to a current acquisition cost value that represents a consumption of computational resources by the first thread after an initial attempt to acquire the mutex and
25 prior to acquiring the mutex.

22. The apparatus of claim 18 further comprising:

means for normalizing the cost value that indicates
a consumption of computational resources by the first
30 thread during the spin state or the sleep state prior to adding it to the current acquisition cost value.

23. A computer program product on a computer readable medium for use in a data processing system for managing a mutex, the computer program product comprising:

5 means for maintaining an average acquisition cost value for a mutex;

means for attempting to acquire the mutex by a first thread; and

10 means for determining to enter a spin state or a sleep state on the first thread based on the average acquisition cost value for the mutex in response to a determination that the mutex has already been acquired by a second thread.

24. The computer program product of claim 23 wherein the
15 average acquisition cost value indicates an average consumption of computational resources by threads in acquiring the mutex.

25. The computer program product of claim 23 further
20 comprising:

means for maintaining a thread-specific current acquisition cost value that represents a consumption of computational resources by the first thread after an initial attempt to acquire the mutex and prior to
25 acquiring the mutex; and

means for recomputing the average acquisition cost value for the mutex to include the thread-specific current acquisition cost value in response to the first thread acquiring the mutex.

26. The computer program product of claim 23 further comprising:

means for entering a spin state if the average acquisition cost value satisfies a first condition; and

5 means for entering a sleep state if the average acquisition cost value satisfies a second condition.

27. The computer program product of claim 26 wherein the first condition is that the average acquisition cost
10 value is less than a threshold value, and wherein the second condition is that the average acquisition cost value is greater than or equal to a threshold value.

28. The computer program product of claim 27 wherein the
15 threshold value is related to an amount of time that is required by a thread to enter and then exit a sleep state.

29. The computer program product of claim 23 further
20 comprising:

means for entering a spin state or a sleep state on the first thread; and

means for computing or retrieving a cost value that indicates a consumption of computational resources by the
25 first thread during the spin state or the sleep state after exiting the spin state or the sleep state on the first thread.

30. The computer program product of claim 29 further comprising:

means for entering a spin state on the first thread by executing a busy-wait loop; and

5 means for computing the cost value that indicates a consumption of computational resources by the first thread during the spin state based on a number of iterations that are executed within the busy-wait loop.

10 31. The computer program product of claim 29 further comprising:

means for entering a sleep state on the first thread by executing a system call to suspend execution of the first thread; and

15 means for computing the cost value that indicates a consumption of computational resources by the first thread during the sleep state based on an amount of time that the first thread is in the sleep state.

20 32. The computer program product of claim 29 further comprising:

means for adding the cost value that indicates a consumption of computational resources by the first thread during the spin state or the sleep state to a
25 current acquisition cost value that represents a consumption of computational resources by the first thread after an initial attempt to acquire the mutex and prior to acquiring the mutex.

33. The computer program product of claim 29 further comprising:

means for normalizing the cost value that indicates a consumption of computational resources by the first
5 thread during the spin state or the sleep state prior to adding it to the current acquisition cost value.